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Prevalence and predictors of food insecurity among pregnant women: A cross sectional study in Qazvin Province, Iran☆

Farideh Kazemi, Ph.D.[a], Farnoosh Moafi, MSc.[b], Fatemeh Samiei Siboni, MSc.[b], Zainab Alimoradi, Ph.D.[b,*]

[a] Faculty of Nursing and Midwifery, Hamadan University of Medical Science, Hamadan, Iran
[b] Social Determinants of Health Research Center, Qazvin University of Medical Science, Qazvin, Iran

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ABSTRACT

Introduction: Food insecurity is associated with adverse health consequences in women, especially pregnant ones. Present study is aimed to investigate prevalence and predictors of food insecurity among pregnant women.

Method: A cross-sectional study was conducted on 394 pregnant women in Qazvin during November 2016–May 2017. The Household Food Insecurity Access Scale (HFIAS) was used to assess food insecurity among pregnant women. Besides, the relationship of demographic, midwifery and socioeconomic factors was investigated using Chi-squared and logistic regression tests. Then, the obtained data were analyzed in Stata-12 software at the significance level of 0.05.

Findings: Nearly 44% of the participants had food insecurity. In multivariate analysis, only husbands' unemployment and unwanted pregnancy were associated with food insecurity; thus, the chance of food insecurity among women with unemployed husband was higher than the women with employed husband by 4.7 times [OR (95% CI) = 4.69(1.64, 13.42)]. Furthermore, the probability of food insecurity among the participants with unwanted pregnancy was twice more than those with wanted pregnancy [OR (95% CI) = 2.07(1.14, 3.74)].

Conclusion: Unemployed husband and unwanted pregnancy are related to food insecurity among pregnant women. Nevertheless, due to the nature of this study, it was not possible to clearly specify the path of such a relationship. To reduce food insecurity among pregnant women, it is essential to take all the necessary measures for providing financial supports for pregnant women through different ways in order to reduce the stress and worries caused by financial burden of pregnancy, and to improve nutrition quality and eating behaviours among pregnant women.

Introduction

Food insecurity is defined as limited or variable access to sufficient nutrients and safe foods, and limited or variable ability to achieve acceptable foods through acceptable ways (Hasan-Ghomi et al., 2012). In fact, food insecurity refers to the lack of access to food and it also embraces the perceptive aspect including insufficiency of food in terms of quality and quantity, social unacceptability of food and worries about food. Besides, it is a consecutive experience, which is initiated from worries and anxiety about food at the household level and developed to the emergence of hunger among children (Payab et al., 2012).

Food insecurity has been known as a major and severe problem in public health during the past two decades and, thus, has been highly regarded by people, experts and policy-makers (Najibi et al., 2013). The most recent estimation of FAO indicates that nearly 805 million people have been suffering from chronic malnutrition during 2012–2014. Besides, during the same period, the prevalence of malnutrition at the global level and in developing countries has been 11.3% and 13.5%, respectively (Fao, 2014).

Furthermore, the prevalence of food insecurity in Iran has been investigated in various studies using different questionnaires. For example, the prevalence of food insecurity in Yazd, Shiraz, Tehran and Tabriz has been reported to be 30.5% (Karam Soltani et al., 2007), 44% (Ramesh et al., 2010), 52.8% (Hasan-Ghomi et al., 2012) and 36.3% (Alireza et al., 2006), respectively.

Some of the factors associated with food insecurity include low income, female-headed household, number of children, minority race, level of assets and socio-psychological factors (Laraia et al., 2010). Food

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* Corresponding author: Qazvin University of Medical Science, Bahonar blv. Qazvin, Iran. 34197-59811
E-mail addresses: zainabalimoradi@yahoo.com, z.alimoradi@qums.ac.ir (Z. Alimoradi).

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insecurity can result in adverse health consequences in various groups. Household's food insecurity can be very important, especially among women, because reduced consumption of micronutrients among women at the age of pregnancy can lead to a significant reduction in the consumption of fruits and vegetables as well as a considerable increase in irregular food patterns (Laraia et al., 2010).

A pregnant woman's nutrition status, due to its effects both on the mother and on the fetus, is one of the major worries of health experts. One of the main causes of pregnancy-caused mortality is the mothers' poor nutrition status. Pregnancy imposes an excessive burden on the body processes and systems, which can lead to the increased vulnerability of women in different forms, including nutritional disorders and nutritional anaemia (Holeye et al., 2014). Proper nutrition during pregnancy is vital for optimal growth and development of the fetus; on the other hand, food insecurity during pregnancy is associated with poor diet quality, especially reduced calorie intake (Hromi-Fiedler et al., 2011). The mother's food insecurity would result in the increased probability of low birth weight (Borders et al., 2007) and might be associated with the increased risk of birth-specific deficiencies such as CLP (cleft lip and palate), transposition of great vessels, tetralogy of fallot and spina bifida (Carmichael et al., 2007). Among pregnant women with HIV, poor nutrition status, which might be resulted from food insecurity, can increase the risk of vertical transmission of HIV to the baby (Gillespie and Kadiyala, 2005). Further, reduced mental health of mothers is related to food insecurity (Laraia et al., 2006). The mental factors, including depression, stress and anxiety that are associated with the household's food insecurity in a dose-response relationship, indicate that the poorer the food insecurity status, the more the symptoms of these mental factors would be (Hromi-Fiedler et al., 2011).

Thus far, several studies have been conducted on the prevalence of food insecurity in Iran. According to these studies, the prevalence of food insecurity among ordinary household ranges between 20 and 60%, while it ranges from 75% to 86% among the families with low income or female-headed households. Moreover, the predictors of food insecurity have been investigated in several studies, among which increased family size, birth ranking, education, job status of parents, family income and economic status can be mentioned (Alimoradi et al., 2015). However, the prevalence and relevant factors of food insecurity among pregnant women have not been studied yet. The increased nutritional needs and presence of psychological states during pregnancy can lead to challenges for desirable nutrition among pregnant women and expose them to the risk of food insecurity. Therefore, the present study is aimed to investigate the prevalence and predictors of food insecurity among pregnant women.

Method

The present descriptive cross-sectional study work conducted on 394 pregnant women in Qazvin during November 2016 to May 2017. According to Alimoradi et al. (2015), who systematically reviewed the prevalence of food insecurity in Iran, the prevalence varied from 20% to 60% overally which increased to 75- 86% in households headed by women, and low-income households (Alimoradi et al., 2015). Considering the lowest possible prevalence of 20%, 0.02 precision and $\alpha = 0.05$; the sample size was calculated based on the below formula.

$$n = \frac{z^2_{\left(1-\frac{\alpha}{2}\right)} P(1-P)}{d^2}$$

After dividing Qazvin Province into four geographical regions, three centers were selected from each region through randomized cluster sampling method. Sampling in these centres was performed via convenient sampling method. The inclusion criteria included intrauterine pregnancy, gestational age of 10–30 weeks, lack of chronic medical problems and lack of gestational complications. If the participant had the inclusion criteria as well as the tendency to participate in the project, then the questionnaire of demographic, midwifery and socio-economic characteristics as well as the Household Food Insecurity Access Scale (HFIAS) was completed by the researcher through interviews.

HFIAS is a simple instrument for measuring food security, which reflects the household head's feeling about food insecurity of the self and the family in the form of some conversational statements. HFIAS has been designed as a simple and fast approach to measure the access component of food security. In HFIAS, questions do not directly refer to the nutrition quality, but cover the household's perception of the changes in food quality regardless of the actual nutrition composition. Validity of this questionnaire has been confirmed in the study conducted by Salarkia et al. on the families residing in Varamin City (Salarkia et al., 2011). Based on this questionnaire, individuals are divided into four groups: *Food secure* (0–1 point), *Mildly food insecure* (2–7 points), *Moderately food insecure* (8–14 points) and *Severely food insecure* (15–27 points). Reliability of this questionnaire was investigated in the present study through test-retest method in a two-week interval among a 30-participant sample of pregnant women. The intraclass correlation coefficient of 0.85 implied reliability of the instrument. In this study, the participants were allocated to two groups of *Food secure* (0–1 point) and *Food insecure* (2–15 points) based on the obtained scores.

The demographic, midwifery and socioeconomic characteristics were investigated via questions on age, education, husband's education, job, husband's job, living place, living place ownership status, economic status, gestational age, number of children, pregnancy status and gender of fetus.

Finally, the collected questionnaires were imported into STAT-12 software and data analysis was performed using Chi-squared and logistic regression tests at the significance level of 0.05.

Ethical considerations

The research proposal was approved by institutional research committee and also institutional ethical committee. The permission letter required for presence in medical centres was obtained. After obtaining the permission for the intended clinics, the researcher introduced himself to the participants. After expressing the research objectives, assuring the participants about confidentiality of their information and their liberty for participating or not participating in the project, and also after obtaining the written informed consent from the qualified pregnant women who tended to participate in the research, the questionnaires were filled out by a well-trained co-worker through interviewing.

Findings

1- *Demographic, midwifery and socioeconomic characteristics of participants*

The majority of the participants (58%) aged between 25 and 35 years old. Besides, the majority of them were in the second half of their gestational age. More than half of the participants (53.8%) had no children. Most of the participants as well as their husbands had non-academic education. Among the participants, 35 women (8.9%) and 23 husbands (5.8%) were unemployed. Furthermore, the majority of the participants (82.5%) had wanted pregnancy. The remaining information is presented in Table (1).

2- *Prevalence and relevant factors of food insecurity*

Among the participants, 173 (43.9%) had food insecurity (Table 1). Results of the univariate test indicated that having more than one child,

Table 1
Socio-demographic attributes of participants.

Variable		No	%
Food security status	Food secure	221	56.1
	Food insecure	173	43.9
Age (year)	25>	120	30.5
	25 to 35	228	57.9
	35<	46	11.7
Number of children	No child	212	53.8
	1	131	33.2
	2	39	9.9
	≥3	12	3.0
Gestational Age (week)	<20	142	36.0
	≥20	252	64.0
Educational status	Non academic	261	66.2
	Academic	133	33.8
Husband' educational status	Non academic	276	70.1
	Academic	118	29.9
Job	Housewife	359	91.1
	Employed	35	8.9
Husband' job	Unemployed	23	5.8
	Employed	371	94.2
Residency	Urban	383	97.2
	Rural	11	2.8
Pregnancy willingness	Wanted	325	82.5
	Unwanted	69	17.5
Fetus' gender	Female	157	39.8
	Male	152	38.6
	Don't known	85	21.6
Residential home status	Landlord	174	44.2
	Tenant	220	55.8
Perceived economic status	Week	194	49.2
	Moderate	169	42.9
	Good	**31**	**7.9**

education of the woman and her husband, husband's job and pregnancy status had significant relationships with food insecurity. Those variables of the univariate analysis, which had the OR of less than 0.8 or more than 1.2, were imported into the logistic regression. By controlling the probable intervening variables, only the husband's job and pregnancy status had significant relationships with food insecurity so that the probability of food insecurity among the women with unemployed husbands was increased compared to the women with employed husbands by 4.7 times [OR (95% CI) = 4.69(1.64, 13.42)]. Moreover, the probability of food insecurity among those women with unwanted pregnancy was twice more than those with wanted pregnancy [OR (95% CI) = 2.07(0.14, 3.74)] (Table 2).

Discussion

This work was the first research, in which the prevalence and predictors of food insecurity were investigated among pregnant women in Iran. Based on the results, almost 44% of the pregnant women participating in this study were food insecure, which was significant. Due to the increased need for food during pregnancy, pregnant women are more influenced by food insecurity and food insecurity during pregnancy is of great importance due to its relationship with gestational consequences and complications (Laraia et al., 2010; Borders et al., 2007; Ivers and Cullen, 2011). In the study conducted in Nigeria, the prevalence of food insecurity among pregnant women was reported to be similar to the one in the present study (42.2%) (Sholeye et al., 2014); however, in another study conducted in North Carolina (Laraia et al., 2010), only 8% of the pregnant women were food insecure, which was insignificant compared to the present investigation.

In the previous studies, the predictors of food insecurity among pregnant women included low income, low education, higher number of children, higher age of mother and mother's being housewife (Laraia et al., 2006; Shariff et al., 2014). Findings of the present study showed that one of the predictors of food insecurity among pregnant women was having unemployed husband. Since only 9% (35 individuals) of the studied pregnant women were employed, the economic burden of the family was on the husbands' shoulders; thus, unemployment of the husband could significantly increase food insecurity among pregnant women by affecting the family's economic status. Another predictor of food insecurity among pregnant women participating in this study was unwanted pregnancy so that the chance of food insecurity among women with unwanted pregnancy was twice as much as those with wanted pregnancy. Various studies have shown that problems such as depression, anxiety, stress and reduced self-confidence during pregnancy can be associated with food insecurity during pregnancy (Laraia et al., 2006; Casey et al., 2004; Hadley et al., 2007). Therefore, the mental burden caused by unwanted pregnancy can be considered as one of the reasons for the relationship between food insecurity and unwanted pregnancy.

Although some of the variables exhibited no significant relationship with food insecurity, investigation of the adjusted OR rate indicated their importance for this issue cannot be disregarded. For example, having two or more children exhibited no significant relationship with food insecurity, but investigation of this variable indicated that having two or more children would increase the probability of food insecurity among pregnant women compared to the families without any child by 74–80%. The same point applied for the education of the woman and her husband so that non-academic education of the participants and their husbands increased the probability of food insecurity by 44% and 60%, respectively. Moreover, although the household's low income is considered as one of the major risk factors of food insecurity among pregnant women (Laraia et al., 2006; Sharkey et al., 2011) and in different population groups (Chaparro et al., 2009). the relationship between income level and food insecurity was not investigated in the present study; instead, the participants were asked to estimate the economic status of their families and classify themselves into three groups of good, medium and poor in terms of the household's economic status. The results indicated that poor economic status, compared to the good one, would increase the probability of food insecurity among pregnant women by 36%.

According to the above-mentioned results, one of the limitations of the present study was the small size of the sample. Although the sample size in this study had enough statistical power to show the relationship between food insecurity during pregnancy and having unemployed husband or unwanted pregnancy, it did not afford to demonstrate the significant relationship between food insecurity and number of children, education of woman and her husband as well as economic status, which had considerable OR for food insecurity. Accordingly, it seems that increasing the sample size would lead to better results in this regard. Another limitation of the present study was that the cross-sectional nature of the study did not provide the possibility for specifying the path of the relationship between the variables. For example, in some cases such as unwanted pregnancy, it was not clear whether the food insecurity and lack of sufficient food caused the participant to assume their pregnancy as unwanted or the unwanted pregnancy led to food insecurity among pregnant women as the result of creating psychological problems.

Table 2
Results of univariate and multivariate analysis for related factors in pregnant women.

	Food security status		Unadjusted		Adjusted*	
	Food secure (n = 221)	Food insecure (n = 173)	p-value	OR (95% CI)	p-value	OR (95% CI)
Age (year)						
>25	72 (60.0)	48 (40.0)		1		
25 to 35	129 (56.6)	99 (43.4)	0.53	1.15 (0.73. 1.80)		
35<	20 (43.5)	26 (56.5)	0.056	1.95 (0.97, 3.91)	0.69	1.15 (0.56, 2.35)
Number of children						
No child	130 (61.3)	82 (38.7)		1		
1	72 (55.0)	59 (45.0)	0.24	1.29 (0.83, 2.02)	0.84	1.05 (0.64, 1.70)
2	15 (38.5)	24 (61.5)	0.008	2.53 (1.24, 5.17)	0.14	1.80 (0.81, 4.02)
3≥	4 (33.3)	8 (66.7)	0.054	3.17 (0.91, 11.00)	0.40	1.74 (0.46, 6.58)
Gestational age (week)						
<20	83 (58.5)	59 (41.5)		1		
20≥	138 (54.8)	114 (45.2)	0.47	1.16 (0.76, 1.76)		
Educational status						
Non academic	92 (69.2)	41 (30.8)		1		
Academic	129 (49.4)	132 (50.6)	0.0001>	2.29 (1.46, 3.59)	0.18	1.44 (0.84, 2.45)
Husband' educational status						
Non academic	81 (68.6)	37 (31.4)		1		
Academic	140 (50.7)	136 (49.3)	0.001	2.12 (1.34, 3.37)	0.09	1.59 (0.91, 2.76)
Job						
Housewife	202 (56.3)	157 (43.7)		1		
Employed	19 (54.3)	16 (45.7)	0.82	1.08 (0.53, 2.17)		
Husband' job						
Unemployed	216 (58.2)	155 (41.8)		1		
Employed	5 (21.7)	18 (78.3)	0.0001>	5.01 (1.79, 14.03)	**0.004**	4.69 (1.64, 13.42)
Residency						
Urban	217 (56.7)	166 (43.3)		1		
Rural	4 (36.4)	7 (63.6)	0.18	2.28 (0.65, 7.97)	0.77	1.22 (0.31, 4.72)
Pregnancy willingness						
Wanted	195 (60.0)	130 (40.0)		1		
Unwanted	26 (37.7)	43 (62.3)	0.0001>	2.48 (1.44, 4.27)	**0.01**	2.07 (1.14, 3.74)
Fetus' gender						
Female	92 (58.6)	65 (41.4)		1		
Male	81 (53.3)	71 (46.7)	0.34	1.24 (0.79, 1.94)	0.23	1.30 (0.84, 2.01)
Do not know	48 (56.5)	37 (43.5)	0.74	1.09 (0.63, 1.86)		
Residential home status						
landlord	103 (59.2)	71 (40.8)		1		
Tenant	118 (53.6)	102 (46.4)	0.27	1.17 (0.83, 1.87)		
Perceived economic Status						
Week	19 (61.3)	12 (38.7)		1		
Moderate	105 (62.1)	64 (37.9)	0.92	0.96 (0.43, 2.12)		
Good	97 (50.0)	97 (50.0)	0.24	1.58 (0.72, 3.45)	0.16	1.36 (0.88, 2.10)

* logistic regression.

Conclusion

Results of the present study showed that having unemployed husband is a powerful predictor for food insecurity among pregnant women. As previously mentioned, the women with high levels of stress during their pregnancy would experience food insecurity with higher probability. Unemployment of the husband is related to food insecurity among pregnant women both directly, via affecting the family's economic status and, consequently, lack of appropriate access to necessary and sufficient nutrients, and indirectly, via creating worries and stress about proving life expenses. Resolving the living and employment problems requires spending a large amount of time and money as well as providing the necessary grounds across the country. These long term measures might be inappropriate to resolve the problem of food insecurity during pregnancy. Pregnancy is a vulnerable period and also a proper nutrition during pregnancy is vital for appropriate growth and development of the fetus; so, it is necessary to take measures for preventing the complications of food insecurity and its subsequent damages during pregnancy. In this regard, an appropriate approach can be the allocation of food coupons or food packages to the households during the pregnancy period. Furthermore, by reducing the expenses related to pregnancy and delivery, such as the expenses of ultrasound, diagnostic tests and drugs, the pregnancy-related economic burden imposed on the families can be reduced, which can help improve pregnant women's living conditions and prevent the incidence of food insecurity during pregnancy. Moreover, among women with unwanted pregnancy, if the food insecurity has occurred as the consequence of unwanted pregnancy, psychological consultations during pregnancy can help resolve the problem.

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Clinical trial registry

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